

CANCER RESEARCH IN AUSTRALIA

MUCH has been recently written telling of the steady increase in the mortality from cancer in almost every country. This increase is a matter of the gravest international concern, and I think it will be universally admitted that the attention of statesmen and the general public as well as the medical profession in all climes should be directed to any facts relating to the cause of the increase, and to any suggestions that may be made for the prevention or diminution of so deplorable a state of affairs.

Increase and Mortality.

My object then in this article is to endeavour to throw some light on the cause of the increase of cancer and its mortality in Australia, and to give the conclusions I have formed from personal investigation as to certain factors bearing on the cause of the disease, together with suggestions for its prevention which appear to me absolutely necessary in order to check the terrible onslaught of its ravages.* No country presents better opportunities for studying the cause and treatment of cancer than Australia. Being practically a new country it is possible to trace the moral and social conditions of life existing among the inhabitants from the period of the earliest arrivals, as well as to determine which class of the inhabitants—native, British or foreign born—has proved most susceptible to cancer and may be credited with the greatest increase in the disease and its mortality during the last forty years.

It was not until 1856 that the first systematic report of deaths from cancer was recorded, when statistics showed a death-rate of 14·0 per 100,000 living. At this period the native born death-rate was practically *nil*, owing to the fact that very few had arrived at the time of life (nearly middle age) at which cancer principally manifests itself. Therefore, as the British born proportion of the population was at this period over 50 per cent.

* An article of mine embracing this subject has been recently published in *The Lancet*, Feb. 13th and 20th, 1904, to which I would refer readers who may desire to learn fuller particulars of this investigation.

of the total inhabitants, their death-rate would show 28·0 per 100,000 living British born. In 1861 the Australian born proportion of the population was about 45 per cent. and the British born 46 per cent. of the total inhabitants. The Australian born death-rate at this period appears to be 5·6 per 100,000 living Australian born, while the British born was 30·5 per 100,000 living British

TABLE Showing the Comparative Increase in the Death-rate from Cancer among the Australian and British born Proportion of the Population and the Increase in the Cancer Death-rate of the Total Population from 1856 to 1901 (exclusive of the Aborigines.)

Year.	Population.	Proportion of death-rates from cancer per 100,000 living.		
		Australian born.	British born.	Born of all nationalities.
1851	403,889	—	28·0*	14·0
1861	1,153,973	5·6	30·5	19·0
1871	1,668,377	9·7	56·7	25·0
1881	2,252,617	16·8	72·9	32·6
1891	3,183,237	19·8	119·8	45·9
1901	3,771,715	22·6	203·1	57·3

* Calculated for the year 1856.

born. In 1901 the Australian born proportion of the population had increased to 77 per cent. of the total inhabitants and the British born had diminished to 16 per cent. But it is interesting to note that during this period of 40 years, while the Australian born proportion of the population had increased by about 3,000,000, their cancer death-rate had only increased to 22·6 per 100,000 living Australian born, whereas the British born proportion of the total inhabitants had only increased by about 354,000, yet their cancer death-rate had increased to 203·1 per 100,000 living British born. In other words, between the years 1861 and 1901 the Australian born death-rate had increased by only 17 per 100,000 living Australian born as against 172 per 100,000 living British born.

Death-rate for Age Period.

As the above Table shows only the crude cancer death-rate, before coming to any conclusions one must study the corrected cancer death-rates for the age period, 35 years and upwards, of the Australian, British, and foreign born inhabitants, not only in respect of the total population but also as they affect proportionately the individual nationalities themselves. These calculations I have made, and they are shown in the Table below, from which it will be observed that the crude cancer death-rate for the

TABLE Showing the Crude and Corrected Death-rates from cancer (for 1900), also the Proportion of Deaths from Cancer to 100 Deaths from all Causes for the Commonwealth, its Metropolitan and Country Districts; and the Comparative Death-rates among the Australian, British and Foreign born Proportion of Inhabitants (exclusive of the Aborigines).

Area of Australia.	Crude cancer death-rate.		Corrected cancer death-rate for ages 35 years and upwards.	
	Death-rate from cancer per 100,000 living at all ages and of all nationalities.	Proportion of deaths from cancer to 100 deaths from all causes at all ages and of all nationalities.	Death-rate from cancer per 100,000 living of persons whose ages are 35 years and upwards of all nationalities.	Proportion of deaths from cancer to 100 deaths from all causes of persons whose ages are 35 years and upwards of all nationalities.
All Australia . . .	57·3	5·0	195·3	10·0
Metropolitan districts . . . }	81·3	6·4	326·0	12·8
Country districts . . .	44·7	3·9	134·0	8·4
Native born proportion of population }	17·1	1·5	58·2	3·0
British and foreign born proportion of population . . .	40·2	3·5	137·1	7·1
Native born proportion of population }	22·8 (to 100,000 living native born).	2·3 (to 100 deaths native born).	81·3 (to 100,000 living native born).	6·9 (to 100 deaths native born).
British born proportion of population }	202·1 (to 100,000 living British born).	8·8 (to 100 deaths British born).	490·0 (to 100,000 living British born).	12·5 (to 100 deaths British born).
Foreign born proportion of population	208·3 (to 100,000 living foreign born).	8·5 (to 100 deaths foreign born).	351·6 (to 100,000 living foreign born).	11·8 (to 100 deaths foreign born).

whole of Australia was 57·3 per 100,000 living, of which the Australian born cancer death-rates accounted for 17·1 and the British and foreign born 40·2. But when these death-rates are corrected for the age period of 35 years and upwards the total death-rate is 195·3 per 100,000 living, of which the Australian born proportion was 58·2 and the British and foreign born 137·1.

The relative difference between the Australian, British and foreign born death-rates appears all the more striking when we compare them in respect to each of their proportions of living population. This I have also calculated for each State separately, corrected for the age period and averaged the results. Thus it will be seen that the crude cancer death-rate of the Australian born was 22·8 per 100,000 living of their population, while the British born was 202·1 per 100,000 living of their proportion of the population. And when these figures are corrected for the age period of 35 years and upwards, the difference between the two death-rates is most amazing, the Australian born being only 81·3 per 100,000 living native born, whilst the British born is 490·0 per 100,000 British born.

It will also be seen that for the whole of Australia cancer claims one death out of every 20 deaths from all causes. The Australian born proportion is one death from cancer for every 66 deaths from all causes, whereas the British born proportion is one death from cancer for every 28 deaths from all causes. When these figures are corrected for the age period of 35 years and upwards the death-rate from cancer is found to be one death in every ten, the Australian born being one death in every 33, and the British born one death in every 14. The Australian born proportion of deaths from cancer to 100 deaths of the native born inhabitants from all causes and at all ages was 2·3, or one death in every 43, whereas the British born proportion of cancer deaths to 100 deaths of the British born inhabitants from all causes and at all ages was 8·8, or 1 in 11. When these death-rates are corrected for the age period of 35 years and upwards it is found that the Australian born proportion is 6·9, or about one death in every 15, whereas the British born proportion is 12·5, or one death in every 8. The cancer death-rate of the foreign born inhabitants is also very high when compared to that of the native born. The figures show that the foreign-born' death-rate from cancer per 100,000 living foreign born is 208·3, and corrected for the age period of 35 years and upwards the death-rate is 351·6. The foreign born proportion of deaths from cancer to 100 deaths from all causes and at all ages of the foreign born inhabitants is 8·5, or about one death in 11, and these figures corrected for the age period of 35 years and upwards show 11·8, or about one death in every 8 from all causes.

Foreign-born Inhabitants.

The death-rate from cancer of the foreign born inhabitants varied considerably according to their nationality, as the following Table indicates.

TABLE Showing the Death-rate (for 1900) from Cancer of Foreign Born Inhabitants.

Country.	Death-rate from cancer per 100,000 living.	Proportion of cancer deaths to 100 deaths from all causes, 35 years and upwards, of each nationality.
Germany	252	11·0
France	375	16·6
Austria	300	16·0
Russia.	80	5·4
Sweden and Norway	289	15·6
Chinese Empire	72	5·0
Italy	65	5·0
United States of America . .	61	2·0

Italy and the United States of America show a comparatively low death-rate when compared with other foreign countries; on the other hand, Germany, France, Austria, Norway and Sweden show even a much higher death-rate than the British born inhabitants of the Commonwealth. The Chinese, who form the largest proportion of the foreign born inhabitants of Australia, also show a low death-rate when compared with other foreign countries. From 1316 deaths of Chinese registered in Victoria between the years 1894 and 1900 from all causes 49 only were recorded as having died from cancer. For the same period in Victoria, out of 70 cases of deaths registered as having occurred amongst the aborigines of that State but one case of cancer was recorded.

A Comparison.

TABLE Showing the Death-rate from Cancer (for 1900) for each State of the Australian, British, and Foreign born Inhabitants respectively, according to their Percentage of the Total Population (exclusive of the Aborigines.)

State.	Australian born.		Natives of the United Kingdom and other portions of the British Empire.		Foreign born.	
	Percentage to the total population.	Cancer death-rate per 100,000 living. Australian born.	Percentage to the total population.	Cancer death-rate per 100,000 living.	Percentage to the total population.	Cancer death-rate per 100,000 living.
New South Wales	80·52	21·0	16·28	201·1	2·61	207·2
Victoria	79·42	28·6	17·92	283·0	2·15	245·3
Queensland	65·20	23·4	25·42	107·8	8·71	195·6
South Australia	80·06	22·7	15·69	192·2	3·73	202·4
Western Australia	70·51	15·4	22·60	81·5	5·65	120·0
Tasmania	86·82	20·0	11·54	223·0	1·29	230·0
Commonwealth of Australia	77·02	22·8	19·50	202·1	3·28	208·3

Thus Victoria shows a higher death-rate from cancer than any of the other States, Western Australia being the lowest. Tasmania has a high death-rate from cancer among the British born inhabitants.

Annual Statistics.

The following Table tells its own grim tale of the steady increase in the number of deaths and the death-rates from cancer in each State from 1870 to 1900.

TABLE Showing Number of Deaths and Death-rates from Cancer in each State since 1870 (exclusive of the Aborigines.)

Number of Deaths.

State.	1871-1875.	1876-1880.	1881-1885.	1886-1890.	1891-1895.	1896-1900.
New South Wales . . .	772	934	1,146	1,876	2,587	3,548
Victoria	1,245	1,712	2,065	2,799	3,621	4,086
Queensland	125	225	336	508	731	1,071
South Australia	199	352	475	592	803	968
Western Australia . . .	16	23	52	85	102	248
Tasmania.	249	255	308	341	371	459
Australian Commonwealth	2,606	3,501	4,382	6,201	8,215	10,380

Death-rate per 100,000 Living.

New South Wales . . .	28·3	28·2	27·2	36·2	43·1	54·1
Victoria	32·6	41·6	45·3	53·2	61·9	68·9
Queensland	17·4	22·0	24·9	28·1	35·3	45·9
South Australia . . , .	20·4	29·1	32·3	38·4	47·7	54·5
Western Australia . . .	15·4	16·4	33·0	40·7	30·6	31·8
Tasmania.	48·3	46·9	50·4	49·8	49·1	55·5
Commonwealth of Australia	27·6	32·3	34·6	42·2	49·7	57·3

TABLE Showing Death-rates from Cancer (mostly 1900) in various Countries for the Purpose of Comparison with the Death-rates from Cancer in Australia shown in Previous Tables.*

Country.	Death-rate from cancer per 100,000 living.	Proportion of deaths from cancer to 100 deaths from all causes at all ages.	Proportion of deaths from cancer to 100 deaths from all causes of persons 40 years of age and upwards.
England and Wales . . .	82·8	4·5	{ 8·5 (35 years and upwards).
Scotland	81·0	—	—
Ireland.	61·0	—	—
France (towns only, cancer) and tumour.	104·0	4·3	7·6
German Empire	72·7	3·3	{ 6·6 (15 years and upwards).
Austria	70·4	2·7	7·5
Italy	52·1	—	—
Switzerland	132·0	—	—
Holland	91·3	—	—
Norway	84·5	—	—
United States of America (registration area)	60·0	—	—

* This Table was compiled from Mr. Alfred Wolff's figures in an article on "Increase of Cancer" (*The Nineteenth Century and After*, June, 1903.)

Males and Females.

For a number of years deaths from cancer in every Australian State have been more numerous among males than among females. Thus, in Victoria for 11 years (from 1890 to 1900) there were 8533 deaths from cancer, of these 4445 were males and 4088 females; and in New South Wales for seven years (from 1894 to 1900) of a total of 4619 deaths from cancer 2528 were males and 2091 were females. From a calculation I made of the crude cancer death-rate for the whole of the Commonwealth there was very little difference between the death-rates of males and females, but having carefully corrected the cancer death-rates for the age term of 35 years and upwards I found the average death-rates for the whole of the States to be in the proportion of six males to seven females.

From the above tables it is evident that the death-rate from cancer of the British and foreign proportion of the population is abnormally high when compared with that of the Australian born proportion and also when compared with the figures showing the death-rate from cancer in their individual countries. On the other hand, the death-rate of the Australian born is exceptionally low, so much so that it would appear they are almost immune from the disease when compared with the death-rates of the British and foreign inhabitants and after allowing for any inherited tendency. I might here mention that Mr. Coghlan, the chief statistician of the Government of New South Wales, has made an estimate of the children of parents dying from cancer, and from the experience of seven years (from 1893 to 1899) he found that the average families of married males who died from cancer was 6·11, and of females 5·99. Of 761 persons dying from cancer in the State of New South Wales in the year 1899, of whom 281 were born in Australia, 599 (285 males and 314 females) were married, and of these 223 left families.*

Cause of High Death-rate.

The question may now be asked, what, then, is the cause of this high death-rate which has abnormally increased among the British and foreign inhabitants of the Commonwealth of Australia? A brief study of the early history of the country from 1788 to 1856 in respect to the moral and social conditions of the inhabitants, will, I venture to think, throw considerable light on this question. It is well-known that Australia was the dumping ground for convicts for the first 50 years, over 82,000 having been landed between 1788 and 1841. The population of Australia began on

* Vide p. xlii., 'Report on the Vital Statistics of New South Wales, 1899.'

January 26th, 1788, when Captain Phillip arrived in Sydney Harbour with the "first fleet," bringing with him an establishment of about 1030 people. And here it may be well to note the composition of the passengers despatched from England in the six transports which made up the fleet. The ships conveyed 564 male and 192 female convicts; 178 marines, officers and men; 5 medical men; a few mechanics; 40 women, wives of the marines; and 13 children. Several shiploads followed in the same year, and in consequence of overcrowding and insanitary conditions on the voyage, it was discovered that out of a total of 1700 people who had been placed on board in England, 200 died on the voyage; while hundreds of others were in an enfeebled or dying condition when they reached Port Jackson.

In 1803 settlement extended from New South Wales to Tasmania and later on to the other States. From 1800 to 1806, during Governor King's period of office, serious trouble arose from the fact that officers sent out in charge of convicts began trafficking in the rum trade and actually imported large quantities which they retailed at large profits; some officers even set up stills on their own account in defiance of Government orders. This condition of affairs continued until the Imperial authorities appointed Governor Bligh to succeed Governor King, believing that he would correct the abuses which his predecessor seemed powerless to suppress, particularly in regard to the rum trafficking. Governor Bligh, on arrival, issued a stringent proclamation forbidding the bartering in spirits in exchange for other commodities, but without success, as the illicit trade went on throughout his term of office. It was not until he was succeeded by Governor Macquarie that this illicit traffic in spirits was rigidly suppressed and the normal and industrial condition of Australia improved.

Early Settlers.

Alcoholism has played a great part as a factor in the causation of disease, from the very foundation of the country. Between 1851 and 1861 the large increase in the population was due to the gold discoveries, and the class of individuals who arrived in Australia and the condition of affairs existing at this period are best told in the words of Mr. Coghlan.*

All classes and all distinctions were levelled, the thirst for gold seizing upon the entire community. The shops were empty, the streets deserted, the doors of the counting-houses barred, the plough left resting in the furrow, sheep and cattle wandered unattended, while the Port of Melbourne was filled with unmanned vessels, dropping to pieces for lack of attention and repair. . . . Brisk

* Coghlan: 'The Wealth and Progress of New South Wales, 1900-01.'

business was done by saloon proprietors and the shanty and dancing-hall keepers, who became veritable "first robbers" of fortunate diggers. The public service was, however, reduced to abject inefficiency; the police decamped, like their superiors, in search of fortune, and even domestic servants, male and female, joined in the general stampede. The Governor was reduced to a condition of absolute powerlessness, and ruled in Melbourne with hardly any to obey his behests--like a monarch without a realm. Society was, in truth, utterly disorganised, and it was not long before the position became even more embarrassing.

The news reached China, America, Europe, besides neighbouring colonies, and at the port of debarkation up sprang "Canvas Town," formed by the myriad tents of new arrivals. From South Australia and Van Diemen's Land, without reckoning the other colonies, something like 11,000 people poured into Melbourne, bound for the fields, in the latter half of the year 1851. . . . The arrivals from Europe in the early days included not only what has been described by an Australian writer as the "brain and brawn" of the whole world, but many that could have been easily spared--viz., fugitives from justice, adventurers from California and the South Pacific, escaped convicts and disguised bushrangers, sharpers, and professional gamblers from every city on the "Continent" or in the "States," and hordes of Asiatics from Canton and the Straits Settlements, there being not less than 25,000 Chinese whom the gold fever allured to the various fields.

Week after week, and month after month, vessels sailed into Hobson's Bay, landing passengers and discharging their cargoes in the most primitive fashion, for their crews deserted as soon as the ships dropped anchor or came to their moorings. The nobly born and the gently nurtured, professional men and navvies, artisans, farm labourers, deserting soldiers and runaway sailors, "forty-niners" from the fields of California, political refugees from France and Germany and Russia--representatives, in short, of every civilised, and almost every uncivilised, people beneath the sun--poured in never-ending stream into Port Phillip, *en route* for the goldfields. Upwards of 15,000 immigrants arrived by sea during the latter half of 1851, 94,000 during the year following, and in 1853-4-5 nearly a quarter of a million.

To complete this real and graphic statement of the condition of affairs, it is only necessary for me to add that, like alcoholism, syphilis was most prevalent at this period of the history of the country. This dread disease in Australia has gone on its way unchecked, unnotified, and, in the majority of cases, untreated for the necessary length of time so to prevent the horrible ravages of this disease in later life. In support of my statement I may say that since 1893, from among notes on 55 cases of cancer occurring in connection with my own practice in Melbourne, I find out of this number 32, or about 60 per cent., had a syphilitic history, of which 11, or 20 per cent., had inherited the disease and 21, or 38 per cent., had acquired it from 10 to 30 years previously, while in nearly every instance a story of having undergone little or no treatment was elicited. As regards heredity, only seven of the 32 cases, or about 12 per cent., gave a history of cancer having occurred in their families--1 father and 6 mothers; whereas in the remaining 23 cases 12, or about 21 per cent., gave a history of cancer having existed in their families--2 fathers, six

mothers, two sisters, and two brothers. The birthplaces of these 55 cases were as follows: Australia 6, England 23, Ireland 12, Scotland 9, Germany 3, and France 2. It will be noted, therefore, that only 10 per cent. were Australian born, 80 per cent. were born in the United Kingdom, and about 10 per cent. were foreign born.

Immunity of Aborigines.

Investigations as to the prevalence of cancer among the aborigines of Australia have elicited the fact that they are practically immune from the disease. Very little statistical evidence could be obtained of cases of cancer having occurred among the aborigines, although a great number had lived to the age period at which cancer chiefly manifests itself and the death-rate is at its highest. On the other hand, they were particularly susceptible to bronchial and phthisical conditions, the majority dying from these causes. What, then, is the cause of this apparent immunity among the aborigines and the low death-rate from cancer among the majority of the Australian-born white population?

I am of opinion that the indigenous foliage—the eucalypts—exerts a great influence in this direction. The sanitary effects of this vegetation against malaria (a rare disease in Australia) are well known, as it appears to have a beneficial effect on the atmosphere in the region of its growth. The eucalyptus trees, unlike any other forest trees, have a great capacity for absorbing moisture from the soil and any stagnant water at their roots, and they possess the power of giving off fresh from their leaves the water thus absorbed. The powerful disinfecting action of the volatile oils emanating from their leaves and other parts, is mainly due to the fact that they change the oxygen of the atmosphere into ozone and peroxide of hydrogen. The foliage dropped on the ground does not decompose like that of most forest trees, but purifies any germ-infected matter in pools of stagnant water on the ground. The indigenous soil of Australia which grows the food for the cattle possesses sanitary properties which may have an indirect action on their health. Although I have examined many indigenous animals, such as the opossum and kangaroo, for malignant growth, I have never been able to obtain any evidence of cancerous disease among them; whether living on the gum-leaves is the cause of this immunity would be interesting to know. I am inclined to believe such to be the case. On the other hand, malignant growths are prevalent among the cattle, but not nearly so prevalent as among the cattle of other countries.

Eucalyptus Trees.

Mr. Wolff's investigations into the cause of the increase of cancer in various countries, conclusively prove that regions of high cancer mortality are regions of woods and forests possessing insanitary properties. He states: "The facts on this point were everywhere so striking that they seem to establish beyond question that a focus of cancer infection is to be found in regions abounding in woods and water." Lloyd Jones, writing in 1899 on the different conditions in Cambridge under which cancer was observed, says: "Proximity to trees, especially large ones, is connected in some way with the prevalence of cancer. The part of the town which is most free from cancer is singularly devoid of trees and vegetation, while the disease is very prevalent in well-wooded parts of the town, and among houses hemmed in by trees." Other observers have noted similar facts.

Should Mr. Wolff's conclusions be correct, they add additional weight to my theory that the Australian eucalypts and their soil possess some specific action in preventing malignant disease among the aborigines, and the majority of the white Australian-born proportion of the Commonwealth population. It is interesting to note that countries such as Italy, the United States, Portugal, and Algeria, which have transplanted or possess the eucalyptus foliage, show a low death-rate from cancer. India, which possesses the cajuput tree—belonging to the same natural order as the eucalypts, and producing a volatile oil having medicinal properties somewhat similar—also shows a low death-rate from cancer among the native-born population. In short, the native-born population of all countries possessing trees and foliage belonging to the same natural order (*myrtaceæ*) as the eucalypts or their allied species (*lauraceæ*), appear to have a great immunity from cancer, the sanitary properties of the various species no doubt exerting an influence in this direction. Compare this with that of the wooded forest-regions referred to by Mr. Wolff, the dropping foliage of which decomposes, becomes germ-infested, influences the stagnation of the water, and renders the soil insanitary, thereby becoming a great factor in the cause of the high death-rate from cancer in these regions.

Malignant Growths.

Another important fact which appears to support this view and at the same time throws much light on the cause of cancer is that the native populations of countries possessing this foliage, although subject to all varieties of neoplasm, very rarely have malignant new growths. Cancer of the breast and face are instances in point, the scarcity of the former being no doubt due

to the fact that the corset, which to my mind is the principal exciting factor in the cause of cancer of the breast, is an unknown quantity, and of the latter probably being due to the fact that the pigmented skin of the native is better protected from irritation by the rays of the sun. My investigations have proved that most cases of cancer occurring among the native population where the various sanitary foliage referred to is indigenous to the country, such as Australia, India, Batavia, Singapore, Ceylon, China (Formosa), Japan, Zanzibar, Penang, Bencoolen, Amboyna, and similar places, are undoubtedly due to some prolonged local irritation acting on a debilitated constitution. Take India, for instance, kangri cancer is very prevalent among the kangri wearers, due to the constant irritation of the kangri on the skin of the abdomen; Dr. W. J. Elmslie, Dr. J. N. Mitra, and Dr. Neve have conclusively proved this to be the case. Dr. Neve has quoted over 400 cases, and has shown that the disease is no doubt an epithelial cancer, accompanied by glandular infection, ending in death unless cured by operative means.

Cancer of the lip appears to be very rare among the natives of India, owing no doubt to the absence of smoking the short clay pipe; whilst, again, cancer of the mouth is very common, probably due to the constant habit of chewing irritating substances such as tobacco, and betel leaf. Now when we consider these facts and also the amount of malignant disease in European countries due to similar causes—like the prolonged irritation of the pipe on the lip, soot on chimney-sweeps' skin, chewing tobacco on the mouth, corset on the breast—I venture to say that there is sufficient evidence to warrant one in believing that next to hereditary causes prolonged local irritation is the principal exciting factor in the cause of malignant disease. But from the number of individuals who live up to, and long past, the cancer age, and who are subject to prolonged local irritation on all their tissues from one or more or all of the above causes and who never develop malignant disease, it would appear that some other factor is wanting to account for the appearance of cancer.

The Blood Theory.

I have seen no evidence to warrant me in believing that this factor will be found in the laboratory by searchers after the bacterial and parasitic cause. But I have found ample evidence in favour of my theory that this factor is to be looked for by the chemist in the form of a chemical constituent in the blood, occurring chiefly in the debilitated constitutions of those arriving at the cancer age, due to such neglected and untreated diseases as syphilis, alcoholism, obesity, rheumatism, gout, or tubercle. There is every evidence also to believe that

sugar and alcohol play a great part among the exciting causes inasmuch as they enter very largely into the manufacture of beer, sweet wines, and spirits. This fact probably accounts to a large extent for the great contrast in the death-rate from cancer in Australia between the metropolitan and country districts, the larger amount of beer which is consumed in the metropolitan districts favouring a higher death-rate than in the country districts, where less beer is consumed. The same reason may partly account for the very high death-rate among the British and foreign-born proportion of the Commonwealth, compared with the Australian born, as the former class consumes considerably more beer than the Australian born, who drink more wines and spirits. This point is particularly striking in France, where, according to Mr. Wolff, the contrast is very marked between the departments of high cancer mortality, in all of which beer is very largely drunk, and the departments in the centre and the south, where the death-rate from cancer among the wine-drinking population is persistently low. His conclusion is "that the consumption of beer has a distinct influence on the development of cancer."

Hereditary causes of malignant disease may be subdivided into two groups; "inherited" and "congenital." To the first group belong those cases that are inherited as the result of direct action of the malignant virus upon the sperm cells and germ cells prior to, or at the time of impregnation, either parent at the time suffering with malignant diathesis, such cases no doubt being those which develop late in life, the pathological development being accelerated by some one or other of the exciting or irritating causes. Numerous cases are on record of members of the same family having developed malignant disease. I might here mention that in one of my cases—that of a woman who developed cancer at sixty years of age—there was a history of two brothers having previously died from cancer. The congenital group is confined to that class acquired by the foetus during its intra-uterine life, in which case the medium of infection would be the placental circulation; these cases develop either *in utero* or in early life. As instancing this class of case there was reported in the State of New South Wales in the year 1898 one death from cancer, the patient being two years of age. In 1899 there were deaths registered of two children aged two months, and of three aged three years, altogether six deaths of children under five years of age.

Malignic Acid.

Numerous observers in many countries have of late years collected a large amount of evidence showing the frequent

occurrence of the disease in certain streets and houses, which houses have been termed "cancer houses." Several instances have also been recorded of the disease having been transmitted from husband to wife and *vice versa*, and to different individuals who have been drinking from the same vessel or have smoked the same pipe. This evidence leaves very little doubt that some forms of malignant disease are contagious. And I have no hesitation in stating that the majority of the infectious or contagious types of cancer will be found to be a form of malignant syphilis. The theory I venture to advance as the result of my investigations, and upon which my treatment was based, is that the origin of cancer is not due to a bacterial, parasitic, or local cause, but is to be looked for in the blood in the form of an unknown chemical constituent which, for the purpose of description, I will call "malignic acid." This constituent is capable of gradually becoming virulent under certain bad climatic, hygienic, dietetic, and social conditions of life, chiefly manifesting itself at its greatest virulence after forty years of age, the degree of virulence and the age at which it may manifest itself being entirely dependent upon the age and constitutional condition of parents at the time the "malignic acid" diathesis is transmitted and according to the mode of living, environment, and exposure to the exciting causes after birth. The "malignic acid" when excited into virulence in its passage through the blood stream may attack any soft or bony tissue in any part of the body the physiological resistance of which has been weakened by one or other of the exciting causes.

The "malignic acid" possesses the power by a process of chemical reaction of transforming any of the aforesaid weakened tissue into malignant tissue, having particular effect upon debilitated epithelial and connective tissue which has been subjected to prolonged local irritation, attacking and infecting its intracellular matrix and cells. At the same time it sets free the cells to group together in nests or to migrate through the blood and lymph channels either to escape as excretory products or to become deposited on other distant debilitated parts of the body. I am of opinion that the various so-called intracellular and cellular inclusions which have been isolated and so fully described by Plimmer, Schueller, von Leyden, and others to be parasites and by Nosske and Greenhough as secretion deposits are nothing more or less than the transformed remains or deposits (which also for the purpose of description I will term "malignates") of the parent intracellular matrix, some of which has been included in the cells during the process of chemical reaction. The many varieties of malignant growths and lesions, cellular and otherwise, which already have been determined by

pathologists, favour, I venture to think, this theory. Malignant lesion or growth, it is now well known, does not depend upon the amount of cellular elements found therein, as this to a great extent depends upon the structure of the tissue involved. The numerous cases of malignant disease which the microscope has failed to determine prior to operation or ante-mortem, and which have subsequently been confirmed as such after removal or post-mortem examination all favour the "blood-origin theory." The severe constitutional symptoms in the form of emaciation and cachexia, frequently accompanying malignant disease, and which are out of all proportion to the severity of the local or primary lesion, also support this view.

Personal Experience.

The following case which came under my notice in 1903 clearly demonstrated to me that any successful treatment for the arrest of cancer should not depend alone upon attacking or removing the accessible primary lesion. I had occasion to perform a post-mortem examination for a coroner's inquest upon an old man, 72 years of age, who had committed suicide by cutting his throat and hacking the same in a most deliberate manner, and although the cause of death from suicide and haemorrhage was apparent, the law demanded a complete necropsy. Upon performing this the real motive for the poor old man's suicide was made evident. Masses of cancer nodules were found to be studded over the liver, the kidneys, under the pleura, the pericardium, and the endocardium, and although I made a careful search both externally and internally for some primary lesion of considerable size to account for such extension I could not discover one.

Many similar cases have been recorded. From the above experience it is evident that treatment of a so-called accessible primary lesion (which oftentimes may be only a secondary growth) *alone* after the malignant virus has become active is tantamount to treating a syphilitic chancre, gouty, rheumatic, or tuberculous deposit locally, while permitting the secondary lesions to form. I hold, therefore, that as the origin of cancer is in the blood, numbers of so-called primary lesions or growths may manifest themselves simultaneously in different parts of the body, which may be internal or external, inaccessible or accessible. From the moment the malignant virus becomes active, proliferation and degeneration of the tissue and cells in the region attacked commence, and secondary infection and deposits occur. The only method of arresting these pathological conditions is to charge the blood with some antidote to the malignant virus which it contains capable of rendering both the virus and the infected

migrated cells in the blood and lymph channels inert, at the same time removing or attacking directly the primary lesions when accessible at the earliest possible moment.

Preventive and Arrestive.

The treatment of cancer may be divided into two classes—the preventive and the arrestive. I do not propose, however, to do more in this article than to make suggestions in regard to the preventive. Therein lies the only absolute cure for cancer, for only by preventing or avoiding the exciting causes can we hope to diminish the increase in the disease and its progressive death-rate. From the results of my investigations and evidence in my own practice, I firmly believe that syphilis is one of the greatest exciting factors in the cause of malignant disease. And it is not too much to state that the majority of victims suffering from the effects of syphilis, either acquired or inherited, who have not received treatment for the necessary length of time to arrest the undermining of their tissues; by the time they arrive at the cancer age, fall easy prey to the development of malignant disease. Syphilis is increasing in every country at an even greater rate than cancer. When we consider, therefore, how much medical science has done in discovering a successful treatment for arresting the ravages caused by this disease, also the length of time that has elapsed since the discovery was made, it amounts to almost criminal negligence on the part of those governments, religious bodies and faddists, who have deliberately delayed the necessary legislation for protecting their fellow subjects from this highly contagious and inherited disease.

Picture the number of unfortunate children who have inherited syphilis and are daily attending our schools, suffering day after day, year after year, their little brains, nervous systems, and general tissues being gradually undermined and ripening for such diseases as cancer, general paralysis, and other forms of insanity, while governments and other public bodies look on but hesitate to legislate in spite of repeated warnings by nearly every section of medical science of the horrible results of this malady. Dr. Robert Jones, Superintendent of the London County Asylum, Claybury, pointed out at the last annual meeting of the British Medical Association the dire effects of this disease upon the nervous system, and Dr. J. W. Ballantyne of Edinburgh has also shown clearly that women suffering with syphilis at the commencement of pregnancy are unable to bear children unless specific treatment is early begun. It is not necessary to look far therefore, for at least one, if not the greatest, cause of the decrease of population in Australia and other countries.

Notification and Treatment.

Unless notification and treatment of this disease is made compulsory, the prevention and cure of cancer and the other diseases named will be sadly hampered. The medical profession should elect their own representatives to Parliament. The elected president for the time being of the various colleges of physicians and surgeons and special medical and surgical societies should form a medical advisory board to the Government, possessing executive or similar powers to the Board of Admiralty and the new Army Council. The President of the Medical Board should be the Minister of Health with Cabinet rank. Under such conditions legislation in the direction indicated might soon be brought about. Male and female medical officers should be appointed to schools, not only to inspect and treat but to disseminate the necessary knowledge to prevent unfortunate individuals being launched into the world at an early age in such total ignorance of the ordinary conditions of life.

Medical Register.

These inspectors should discharge the duties of district medical registrars, to whom medical practitioners would notify the presence of disease. The medical registrar would forward to the patient through his medical attendant a notice to the effect that he must undergo the necessary length of treatment,* and must not marry until he has received a final certificate that his health permits of same and all other necessary instructions as to the contagious nature of the disease. Should he leave the district he would be required to notify change of address, and be placed under observation of the medical inspector in whose district he went to reside. This medical register would only be open to the inspection of medical men, so that family physicians, if required to do so, in cases of proposed marriages, could inspect the registers and ascertain for parents, without the knowledge of patients, whether they had a healthy record to begin married life upon. By some such method, a great deal of the objection to compulsory notification might be withdrawn, and many sad and deplorable marriages and subsequent horrible results might be prevented. The same kind of confidential arrangement should be instituted among medical men as exists among bank managers, who are able to ascertain from one another the financial position of clients without their knowledge.

* In case the circumstances of the patient would not permit of their carrying out the necessary length of treatment, Government or local bodies should provide the necessary treatment or assist with same.

Summary of the Conclusions.

The conclusions at which I have arrived as the result of my investigations may be summed up thus :—

That cancer is not due to a bacterial or parasitic origin, but is a constitutional disease due to a specific or malignant virus originating in the blood, chiefly manifesting itself after 35 years of age, and at its greatest virulence between 50 and 70 years of age.

That cancer may be congenital, and certain forms are acquired by infection or contagion.

That the principal factor in the cause of cancer is hereditary tendency, and the principal exciting factor is prolonged local irritation acting on a constitution suffering from an inherited tendency, or which has been debilitated through want of treatment of one or other of the following diseases in their order of frequency :—syphilis, alcoholism, obesity, rheumatism, gout or tubercle.

That the principal dietetic factors in the cause of cancer are sugar, beer, and alcohol, and the principal hygienic factors forests, whose dropping foliage, decomposing, produces stagnation of water ; defective drainage ; overcrowding, and poor food.

That cancer is a preventable disease and the absolute cure is only to be found in the means for preventing its exciting causes and completely removing them.

That the sanitary indigenous foliage of the following natural orders :—*myrtaceæ*, *lauraceæ*, *coniferæ*, exerts a specific influence in rendering the native born population of the countries where they grow almost immune from cancer. The Australian Eucalypts, belonging to the *myrtaceæ*, exert the greatest influence in this direction.

That "Mulyptol," a eucalyptus oil obtained by means of a scientific preparation from various species grown in Australia, possesses a specific action in arresting the pathological progress and process of malignant disease.

That all internal and local treatment of a poisonous or irritating nature should be absolutely avoided, more particularly such local treatment as the X Rays and Finsen's Light, as they are likely to set up secondary conditions around the site of lesion.

G. COOKE ADAMS, M.D.